Yellow Science

Scientific Skills Progression & Science Milestones

Scientific Skills

-H1:

--[]Pupil shows curiosity about objects, events and people

--[]Pupil demonstrates awe and wonder in observing things happen

--[]Pupil questions why things happen

--[]Pupil engages in an open ended activity

--[]Pupil takes a risk and engages in new experiences

--[]Pupil learns by trial and error eg dropping a stone into water and observing there is a splash

--[]Pupil finds ways to solve problems/finds new ways to do things/tests their ideas

--[]Pupil develops ideas of grouping, sequences, cause and effect

--[]Pupil recognises similarities and differences in relation to places, objects, materials and living things

--[]Pupil comments and asks questions about aspects of thier world such as the place they live or thier world

--[]Pupil closely observes what animals, people and vehicles do

--[]Pupil uses senses to explore the world around them

--[]Pupil makes links and notices patterns in their experience

--[]Pupil chooses resources they need for thier chosen activities

--[]Pupil handles equipment and tools effectively

--[]Pupil creates simple representations of events, people and objects

--[]Pupil answers how and why questions about thier experiences

--[]Pupil comments upon changes observed and sometimes talks about why

--[]Pupil develops own explanations by connecting ideas or events

-H2:

--[]Pupil explores the world around them and raises thier own simple questions

--[]Pupil experiences different types of science enquiries including practical activities

--[]Pupil begins to recognise different ways in which they might answer scientific questions

--[]Pupil carrys out simple tests with support

--[]Pupil uses simple features to compare objects, materials and living things

--[]Pupil with help decides how to sort and group objects, materials and living things

--[]Pupil asks people questions

--[]Pupil uses simple secondary sources to find answers

--[]Pupil observes closely using simple equipment

--[]Pupil with help observes changes over time

--[]Pupil notices patters and relationships with guidance

--[]Pupil uses simple measurements and equipment (eg hand lenses, egg timers) to gather data

--[]Pupil records simple data

--[]Pupil uses thier observations and ideas to suggest how and why

--[]Pupil talks about what they have found out

--[]Pupil records and communicates findings in a range of ways with support

--[]Pupil begins to use simple scientific language

-H3:

--[]Pupil raises questions about the world around them

--[]Pupil should be given a range of scientific experiences to begin to answer questions

--[]Pupil begins to make thier own decision about the type of scientific enquiry they may use

--[]Pupil sets up a simple practical enquiry which is a fair test

--[]Pupil recognises why a fair test is necessary and helps to decide how to set it up

--[]Pupil talks about how to group, sort and classify using simple keys

--[]Pupil recognises whe and how secondary information might help them answer a question

--[]Pupil makes careful observations

--[]Pupil helps to make decisions about what observations to make, how long to make them for and what type of equipment to use

--[]Pupil begins to look at naturally occuring patterns and relationships and decide what data to collect to identify them

--[]Pupil takes accurate measurements using standard units

--[]Pupil learns how to use a range of new equopment such as data loggers and thermometers appropriatey

--[]Pupil collects and records data from own observations and measures and records in a variety of ways

--[]Pupils with help look for changes, patterns, similarities and differences in thier data to draw simple conclusions and begin to answer questions

--[]Pupil uses relevant simple scientific language to discuss ideas and communicate findings

--[]Pupil with support identifies new questions arising from the data making predictions and improving what they have done

-H4:

--[]Pupil uses thier science experiences to explore ideas and raise different kinds of questions

--[]Pupil talks about how scientific ideas have developed over time

--[]Pupil selects the most appropriate type of scientific enquiry

--[]Pupils begin to use scientific enquiry to answer scientific questions

--[]Pupils recognise when adn how to set up fair tests and explain what needs to be controlled and why

--[]Pupils use and develop keys and information to identify, classify and describe living things and materials and identify patterns in the natural environment

--[]Pupils recognise which secondary sources are useful to research ideas and seperate opinion from fact

--[]Pupils make thier own decisions about what observations to make, measurements to use and how long to make them for

--[]Pupils look for different relationships in thier findings and attempt to support or refute thier ideas

--[]Pupil chooses the most appropriate equipment to make measurements and explain how to use it accurately

--[]Pupil decides how to record data and results from a choice of methods (eg scatter graphs, tables, charts etc)

--[]Pupil identifies scientific evidence that has been used to support or refute thier ideas

--[]Pupil uses relevant scientific language to communicate ideas

--[]Pupil uses their results to make predictions

-H5:

--[]Pupil asks questions and develops a line of enquiry based upon observations of the real world alongside what they have already learnt

--[]Pupil understands that scientific methods and theories develop as earlier explanations and take accound of new ideas

--[]Pupil selects, plans and carries out the most appropriate types of scientific enquiries to test predictions including identifiying different variables where appropriate

--[]Pupil makes predictions using scientific knowledge and understanding

--[]Pupil uses appropriate techniques, apparatus and materials during fieldwork and lab work recognsing the need for health and safety

--[]Pupil suggests improvements to methods and questions reliability

--[]Pupil begins to evaluate risk

--[]Pupil uses some mathematical skills to calculate results

--[]Pupil begins to analyse data collected

--[]Pupil makes and records observations and measurements using a range of methods

--[]Pupil presents observations and data to draw conclusions

--[]Pupil interprets observations and data including patterns to draw conclusions

--[]Pupil presents reasoned explanations relating to predictions

--[]Pupil identifies further questions arising from their results

Science Milestones

-Plants

--[] explore plants with senses

--[] know that plants grow

--[] know that some plants are edible

--[] know that plants are alive

--[] know what plants need to grow and stay healthy.

--[] know some differences and similarities between plants and animals

--[] identify leaf, stem, roots, flower

--[] know where plants fit into food chains

--[] explain how water is transported within plants

--[] name 2 parts of a flower

--[] explain different methods of pollination (e.g. wind, insect)

--[] know that plants reproduce

--[] describe some ways that seeds can be dispersed

--[] classify plants based on characteristics.

--[] identify how plants are adapted to suit their environment and that adaptation may lead to evolution.

--[] use the term 'photosynthesis' correctly

--[] know one input and one output for photosynthesis

--[] stain and examine plant cells with a microscope

--[] compare plant and animal cells

--[] explain the carbon cycle in simple terms

--[] state a link between plants and climate change

--[] know what genetic engineering means in simple terms.

--[] give one reason for and against genetic engineering for food.

-Animals including humans

--[] experience animal life cycles, e.g., observe caterpillar, butterfly

--[] show a reaction to a sensory input, e.g., taste, sound

--[] show knowledge of body parts, e.g., lifts leg on request

--[] Know that humans have human children

--[] knows that some plants and some animals are edible

--[] Knows that animals have different homes

--[] can order the life cycle of at least one animal.

--[] can correctly link 2 sense organs to senses

--[] can identify limbs, head on self and others.

--[] shows understanding that biological males and females have different bodies

--[] knows mammals give birth to live young, birds lay hard shelled eggs

--[] describe at least 2 changes in at least 2 animals as they get older.

--[] understand that most animals need a male and female to produce young

--[] describe/indicate where a human baby grows

--[] know at least 2 animals that live in 2 extreme climates

--[] Order life cycle of a human

--[] describe 2 changes that occur during puberty.

--[] describe in simple terms how mammalian babies are conceived and born.

--[] know that some animals eat plants, some eat animals, and some eat both.

--[] correctly link all 5 senses to the correct input organs

--[] Know the basic needs of animals for survival (water, food and air)

--[] Know 1 benefit of exercise

--[] know 2 components of a balanced diet

--[] know 2 ways you can care for your teeth

--[] know the function of 2 different types of teeth

--[] identify and name a variety of common animals

--[] correctly use the terms carnivores, herbivores and omnivores

--[] describe some differences between 2 of the following: bird, fish, cat, frog, snake

--[] know that living things can be grouped

--[] use simple keys to group, identify and name a variety of living things

--[] know that environments can change and that this can sometimes pose dangers to living things.

--[] know what the skeleton is made from

--[] know that muscles move bones

--[] know 1 function of the skeleton

--[] indicate where the heart is

--[] know the heart pumps blood around our body, and that exercise makes your heart pump faster

--[] Name parts of the body including genitalia

--[] indicate on self the location of teeth, food pipe, stomach, intestines

--[] know in simple terms the function of teeth, food pipe, stomach, intestines in digestion

--[] interpret 3 organism food chains

--[] describe the differences in the life cycles of a human and a frog

--[] describe the life process of reproduction in one non-mammal.

--[] give an example of mammal, reptile, bird, fish, amphibian

--[] give 2 characteristics of each mammal, an amphibian, an insect and a bird

--[] name the main parts of the human circulatory system

--[] describe the functions of the heart, blood vessels and blood

--[] know 4 things that have a negative impact on human health

--[] know the role of the diaphragm in breathing.

--[] know the impact of exercise, asthma and smoking on the human lungs

--[] know the content of a healthy human diet: carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water, and why each is needed

--[] explain some consequences of imbalances in the diet, including obesity, starvation and deficiency diseases

--[] stain and examine animal cells under a microscope

--[] know 2 differences between plant and animal cells.

--[] know that fossils provide information about living things that inhabited the Earth millions of years ago

--[] know that living things change over time

--[] Know that normally offspring vary and are not identical to their parents

--[] give 2 examples of how living things are adapted to suit their environment

--[] understand how adaptation may lead to evolution.

-Materials

--[] sensory exploration of materials

--[] experience changing states of matter – ice / water

--[] choose clothing in different seasons

--[] observe mixing

--[] choosing materials for homes with simple reasons for choice

--[] understand that cooking is not reversible

--[] distinguish between an object and the material from which it is made

--[] identify and name a variety of everyday materials wood, plastic, glass, paper

--[] describe the simple physical properties of wood, plastic, glass, paper

--[] compare and group together a variety of everyday materials on the basis of physical properties.

--[] correctly use the terms melt and freeze

--[] correctly use the term reversible change with an example

--[] correctly use the term irreversible change with an example

--[] choose materials to make a boat and give 2 reasons for choices.

--[] identify a solid, a liquid, and a gas

--[] use the terms melting, freezing, evaporating, condensing

--[] identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

--[] recall the freezing point of water

--[] draw or otherwise show the simple particle model for states of matter

--[] explain the relative closeness and speed of movement of particles

--[] show an understanding of gas pressure in simple terms

--[] explain the concept of a pure substance

--[] explain the concept of mixtures

--[] explain dissolving in terms of particles

--[] explain diffusion in terms of the particle model

--[] describe some techniques for separating mixtures: filtration, evaporation & chromatography

--[] classify materials based on a wider range of characteristics, e.g., hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets

--[] know that some materials will dissolve in liquid to form a solution, and describe how to recover a solute from a solution

--[] know that temperature affects solubility

--[] Give 2 examples of irreversible change

--[] write word equations for 2 irreversible changes

--[] understand the difference between an element and a compound

--[] know the pH scale in terms of 'very acidic, neutral, very alkaline'

--[] give examples of items with low/neutral/high pH and link to properties

---[]-understand that scientists use symbols to represent elements and compounds

--[] recognise the periodic table as a way of organising elements

--[] understand that metals have similar properties to each other

--[] construct atomic diagrams for the first 20 elements

--[] use a given atomic structure to place an element in a group on the periodic table

--[] use a given atomic structure to predict reactivity.

--[] know that elements bond together in fixed ways

--[] know some structures that carbon forms

--[] explain why carbon is 'special'

--[] know the origins of hydrocarbon fuels

--[] understand how distillation works when separating mixtures

--[] know the word equation for combustion

--[] link combustion of fuels to the carbon cycle and climate issues

--[] explain conservation of mass in chemical reactions

--[] balance given chemical equations

--[] explain the anomaly of ice-water transition

-Rocks

--[] group similar looking rocks

--[] describe in simple terms how fossils are formed

--[] know what soil is made from

--[] explain how igneous and sedimentary rocks are formed

--[] explain how metamorphic rocks are formed

--[] know there is a rock cycle

--[] explain the rock cycle

--[] know the internal structure of the earth

--[] know that the Earth is a source of limited resources

--[] know some ways we can preserve resources

--[] know that recycling has limited efficiency.

-Seasonal change

--[] explore different weather

--[] link appropriate clothing to weather and seasons

--[] Identify and contrast different seasons

--[] name seasons and predict weather from observations

--[] describe the changes in day length as the seasons change

--[] know the sun is a source of light and heat

--[] recognise that shadows are formed when the light from a light source is blocked by a solid object

--[] find patterns in the way that the size of shadows change.

--[] describe the movement of the Earth, and other planets, relative to the Sun in the solar system

--[] describe the movement of the Moon relative to the Earth

--[] use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

--[] understand and explain the phases of the moon

--[] explain how the moon impacts tidal patterns on earth

-Light and sight

--[] experience light, dark and colour

--[] name colours

--[] experiment with colour mixing

--[] recognise that they need light in order to see things and that dark is the absence of light

--[] notice that light is reflected from surfaces

--[] recognise that light from the sun can be dangerous and that there are ways to protect their eyes

--[] recognise that shadows are formed when the light from a light source is blocked by a solid object

--[] find patterns in the way that the size of shadows change.

--[] recognise that light appears to travel in straight lines

--[]use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye

--[] explain transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface

--[] use a ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative)

--[] describe that basic operation of the human eye

--[] explain how we see colour

--[] use a prism correctly and link to rainbows

--[] explain that not all light is visible to the human eye

--[] show basic understanding of the electromagnetic spectrum

--[] give some examples of UV and IR light

--[] describe the effect of colour on absorption/reflection of heat

-Sound

--[] experience different sounds, including making sound

--[]experience vibration linked to sound with a resonance board/vibration bench other sensory equipment.

--[] notices cause and effect with sound

--[] name the sense organ associated with hearing

--[] identify how sounds are made, associating some of them with something vibrating

--[] recognise that sounds get fainter as the distance from the sound source increases

--[] associate bigger vibration with louder sounds

--[] know what vibrates to produce sound on 3 musical instruments

--[] recognise that vibrations from sounds travel through a medium to the ear

--[] find patterns between the pitch of a sound and features of the object that produced it

--[] find patterns between the volume of a sound and the strength of the vibrations that produced it

--[] recognise that sounds get fainter as the distance from the sound source increases

--[] sound needs a medium to travel, the speed of sound in air, in water, in solids

--[] auditory range of humans and animals.

-Forces

--[] Experience pushes and pulls with toys and play equipment

--[] find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching

--[] name some simple forces – e.g. push, pull, squash

--[] compare how things move on different surfaces

--[] explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object

--[] identify the effects of air resistance, water resistance and friction that act between moving surfaces

--[] recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect

--[] explain floating and sinking in terms of up thrust and balanced forces

--[] explain that pressure is greater over a smaller area

--[] know that force is needed to cause objects to stop or start moving, or to change their speed or direction

--[] forces as pushes or pulls, arising from the interaction between two objects

--[] use force arrows in diagrams moment as the turning effect of a force

--[] force is measured in newtons

--[] force-extension linear relation; Hooke's Law as an example

--[] non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity.

-Magnetism

--[] notice that some forces need contact between two objects, but magnetic forces can act at a distance

--[] observe how magnets attract or repel each other and attract some materials and not others

--[] compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials

--[] describe magnets as having two poles

--[] predict whether two magnets will attract or repel each other, depending on the poles

--[] know that magnetic field exist

--[] know that the earth has magnetic field and this can be used for navigation

--[] observe the magnetic effect of a current

--[] know that electromagnets can be switched on and off, and some uses for this

-Electricity

--[] Experience battery operated toys.

--[] Use toys with switches.

--[] Understand on/off

--[] What uses mains or battery

--[] give examples of how to use electricity safely

--[] construct a simple series electrical circuit

--[] identify parts of a circuit, including cells, wires, bulbs, switches and buzzers

--[] identify whether or not a lamp will light in a simple series circuit

--[] recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit

--[] recognise some common conductors and insulators, and associate metals with being good conductors.

--[] associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit

--[] use recognised symbols when representing a simple circuit in a diagram.